Available online at www.sciencedirect.com

ScienceDirect

Procedia Economics and Finance 32 (2015) 1384 – 1390

Procedia Economics and Finance

www.elsevier.com/locate/procedia

Emerging Markets Queries in Finance and Business

Euro Area: the long way of recovery

Andrei Rădulescu[a,]*, Daniel Traian Pele[b]

[a]*SSIF Broker, 16, Splaiul Unirii, 8th floor, Bucharest, Romania*
[b]*Bucharest University of Economic Studies, 15-17, Dorobanţi Street, District 1, Bucharest, Romania, 010552*

Abstract

The Euro Area economy marked an inflexion point during 2Q2013, after the prolonged recession determined by the public debt crisis and its consequences. However, the economic divergence among the member countries persists and the recovery process seems anemic and uneven. In this paper we employ the Cobb-Douglas methodology, the Hodrick-Prescott filter and the ARIMA models in order to estimate the potential GDP and forecast the medium-run evolution of the Euro Area economy. According to our results, the Euro Area economic recovery process would be long, as the potential GDP pace would continue to be below the pre-crisis (Great Recession) period at least until 2016.

Keywords: potential GDP; Cobb-Douglas, fixed investments; Euro Area recovery; ARIMA

1. Introduction

The economy of the Euro Area has been severely hit by the waves of the Great Recession (the worst world financial and economic crisis since the end of the World War II). The first wave of the crisis determined the contraction of the capital investments and the deterioration of the public finances. Consequently, the region faced the second wave of the crisis (the public debt crisis), also known as the toughest point in the short history of the Euro Area.

* Corresponding author. Tel.: +40-730-727-516.
E-mail address: andrei.radulescu@ssifbroker.ro.

doi:10.1016/S2212-5671(15)01515-4

In this context, the Euro Area has been confronted with a tough and prolonged macroeconomic adjustment process, as reflected by the severe increase of the unemployment rate (towards a historically high level of above 12% in 2013). On the one hand, the governments in the region have had to implement austerity measures in order to consolidate the public finances. On the other hand, the European Central Bank implemented several expansionary monetary policy measures in order to avoid the breakdown of the Euro Area.

During 2013 the economy of the European Monetary Union got out of the second recession of the past years. The GDP rose by 0.3% qoq during 2Q 2013 and by 0.1% qoq during 3Q 2013. At the same time, the recent evolutions of the leading indicators express better perspectives for the following quarters. In other words, it seems that the Euro Area economy has turned the corner during 2013 (the inflexion from contraction to gradual re-launch) (as can be easily noticed in the Figure 1).

However, the economic re-launch process seems very gradual and uneven, given the impact of several factors for the investment climate in the region (at present, the gross fixed capital formation is at the lowest level since 1999 – the year the Euro was launched, as can be seen in Figure 2):

- The structural problems in the banking sector, which lead to the fragmentation of the monetary policy transmission in the region;
- The persistence and the intensification of the economic divergences among the member states over the past years;
- The dynamics of the public debt in the region.

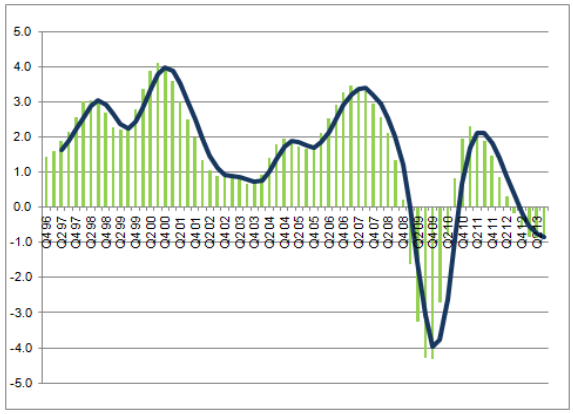

Fig. 1. The evolution of the GDP in the Euro Area (%, yoy, MA4) The evolution of the gross fixed capital formation in the Euro Area (EUR, bn)

In this paper we employ several econometric methods in order to analyze the past evolution and forecast the future evolution (medium-term) for the potential output of the Euro Area. The methodology is shortly described in the following chapter. The empirical results are presented in the third chapter. The last chapter gathers the main conclusions of our analysis.

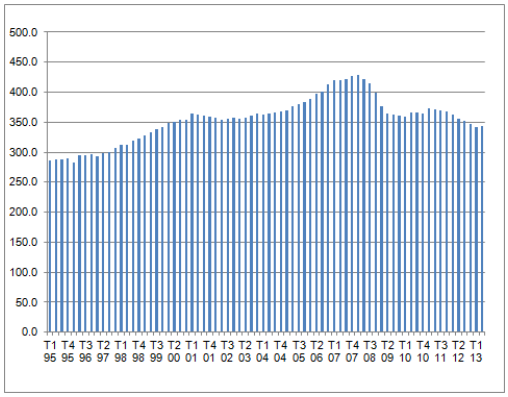

Fig. 2. The evolution of the gross fixed capital formation in the Euro Area (EUR, bn)

2. Methodology

On the one hand we employed the classical Cobb-Douglas method in order to estimate the contribution of the production factors to the potential GDP pace. On the other hand, we employed the ARIMA methods in order to forecast the short-term evolutions of the GDP components (the aggregate demand perspective). Last, but not least, we forecast the short and medium-run evolution of the potential GDP, employing the Hodrick-Prescott filter and the ARIMA models.

- The econometric methods employed in this paper are briefly presented in the following lines.
- In order to estimate the contribution of the production factors to the formation of the GDP pace we employed the classical Cobb-Douglas function (similar to D'Auria, et al. (2010) and European Commission (2012)):

$$Y = L^{\alpha} \, x \, K^{1-\alpha} \, x \, TFP \qquad (1)$$

where Y, L, K, TFP and α represent the GDP, the labor factor, the capital stock, the total productivity factor and the elasticity of the labor factor, respectively. This relation is equivalent with the following (by logaritmizing):

$$Y_t = \alpha \, x \, L_t + (1 - \alpha) \, x \, K_t + TFP_t \qquad (2)$$

where Yt, Lt, Kt and TFPt represent the evolution paces for the GDP, labor factor, capital stock and total factor productivity.

Afterwards, we employed the Hodrick-Prescott filter in order to get the structural component for labor and total factor productivity. The HP filter is reflected by the following relation:

$$Min \sum_{t=1}^{T} (\ln Y_t - \ln Y_t^*)^2 + \lambda \sum_{t=2}^{T-1} ((\ln Y_{t+1}^* - \ln Y_t^*) - (\ln Y_t^* - \ln Y_{t-1}^*))^2 \qquad (3)$$

where Y_t, Y_t^* şi λ represent a macroeconomic variable (for instance GDP), its structural component and the adjustment parameter, respectively. In their work, Hodrick and Prescott (1997) employ a level of 100 for the

adjusment parameter when working with annual data. In our analysis we also employed this 100 value for the parameter λ.

For the labour factor we used the following form

L = labor force x labor participation rate x (1-unemployment rate) x average number of hours worked (4)

As regards the capital stock, we used the classical perpetuity method:

$$Kt = Kt\text{-}1 \times (1-d) + FBCFt \quad (5)$$

where Kt represents the capital stock in the year t, d – is the depreciation ratio, while FBCFt – is the gross fixed capital formation of year t.

We considered the capital stock of 1995 for the Euro Area (12), as estimated by Derbyshire, et al. (2010) and an annual depreciation ratio of 5%.

The structural component of the total productivity factor was estimated by applying the Hodrick-Prescot filter for the TFPt:

$$TFP_t = Y_t - \alpha \times L_t - (1-\alpha) \times K_t \quad (6)$$

We considered a value of 0.65 for the α parameter, a level also used by D'Auria, et al. (2010).

In this paper we employed annual data for the GDP, labor stock, gross fixed capital formation from Eurostat, for the period 1995-2011. For the ARIMA models we used the Eurostat database: quarterly observations for the GDP and its components during the period 1Q 1996 – 2Q 2013.

ARIMA (Auto Regressive Integrated Moving Average) processes are widely used in order to forecast the short-term behavior of macro economical or financial variables (Brockwell and Davis, 1996).

In our analysis, the time series were transformed to stationarity and a linear model was estimated, with the following form:

$$ARMA(p,q) - X_t - \phi_1 X_{t-1} - \ldots - \phi_p X_{t-p} = \mu + \varepsilon_t + \theta_1 \varepsilon_{t-1} + \ldots + \theta_q \varepsilon_{t-q} \quad (7)$$

where X_t is a stationary process and ε_t is a white noise.

3. Empirical results

The main empirical results of our analyses are presented in the following lines. to our results the potential GDP pace of the Euro Area diminished from 2.5% yoy in 1996 to 1.3% yoy in 2007 (the last year of the Great Moderation). The downward trend for this component intensified after the launch of the Great Recession, due to the negative impact of the crisis for the capital investments. The potential GDP pace deteriorated to 0.3% yoy in 2011. On the one hand, the following figure presents the estimates for the contribution of the production factors to the formation of the potential GDP in the Euro Area:

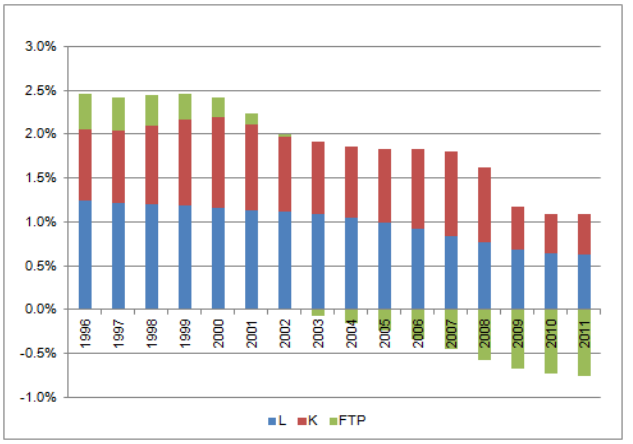

Fig. 3. The contribution of the production factors to the potential GDP pace in the Euro Area (pp)

The severe deterioration of the potential GDP pace in the Euro Area over the past 15 years was mainly determined by the evolution of the total productivity factor: a contribution declining from 0.4 pp in 1996 to 0.2 pp in 2000, turning negative since 2003 (-0.8 pp in 2011).

At the same time, the contribution of labour to the potential GDP pace diminished from 1.2 pp in 1996 to 0.8 pp in 2007 and 0.6 pp in 2011.

The capital contribution to the potential GDP increased from 0.8 pp in 1996 to 1 pp in 2007; afterwards, it declined to 0.5 pp in 2011, due to the incidence of the waves of the Great Recession.

On the other hand, the forecasts for the evolution of the GDP components in the short-run are presented in the following lines. In our core macroeconomic scenario (supported by our ARIMA modeling and forecasting) the Euro Area economy is going to pass through a gradual recovery process in the following quarters: the GDP would accelerate from a 0.3% qoq during 1Q 2014 to 0.8% yoy during 4Q 2014 (as can be noticed in the Figure 4).

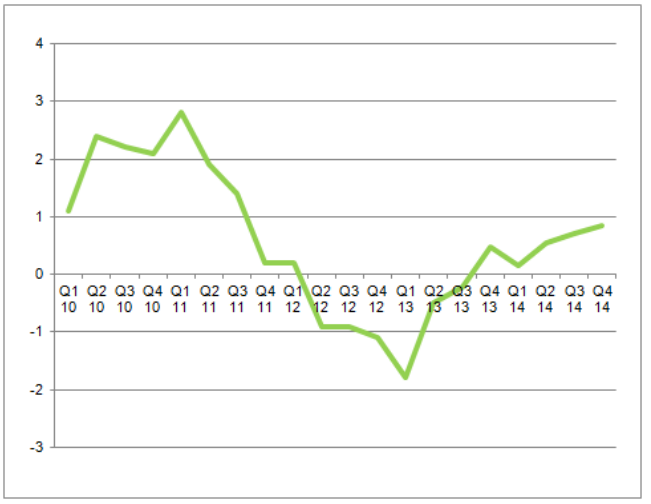

Fig. 4. The evolution of the GDP in the Euro Area (%, yoy)

Our scenario is based on the re-launch of the capital investments in the real economy, after the unfavorable evolutions over the past quarters. We expect the gross fixed capital formation to accelerate in the following quarters (up by 1.8% yoy during 2Q 2014). The re-launch of the investments would be supported by several factors, in our view: the expansionary monetary policy and the stabilization of the credit markets; the improvement of the investment climate in the region, as reflected by the decline of the sovereign risk; the dynamics of the exports over the past quarters (in 2013 the Euro Area exports hit record high levels).

At the same time, the public consumption would gradually increase in the following quarters, to 1% yoy during 4Q 2013, as the governments pass from austerity to expansionary policies (as already signaled by Germany in November 2013).

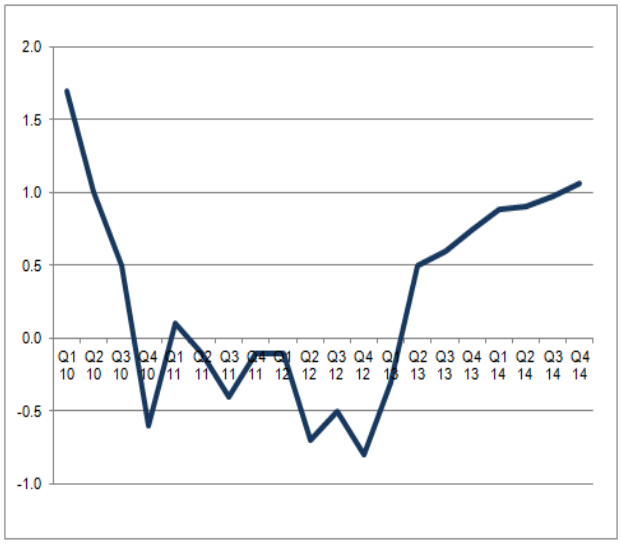

Fig. 5. The evolution of the government consumption in the Euro Area (%, yoy)

Last, but not least, the private consumption (the main component of the GDP) would also re-launch, but at a slower pace (compared to the investments and the public consumption), due to the tough climate in the labor markets (the record high level of the unemployment).

On the other hand, we expect the exports to decelerate in the short-run in the Euro Area, after hitting record levels in 2013. In our scenario, the exports would stagnate yoy during 2Q 2014.

In our scenario, the Euro Area would increase by 0.6% yoy during 2014, after contracting by 0.5% yoy in 2013. In this scenario the gross fixed capital formation and the public consumption would increase by 1.5% yoy and 1% yoy in 2014. On the other hand, the private consumption would decline by 0.1% yoy next year. In terms of net foreign demand, the exports would increase by 0.3% yoy, while the imports would be flat yoy in 2014.

In this scenario the potential GDP of the Euro Area would converge to the pre-crisis level by 2016, as ca be noticed in the following graph.

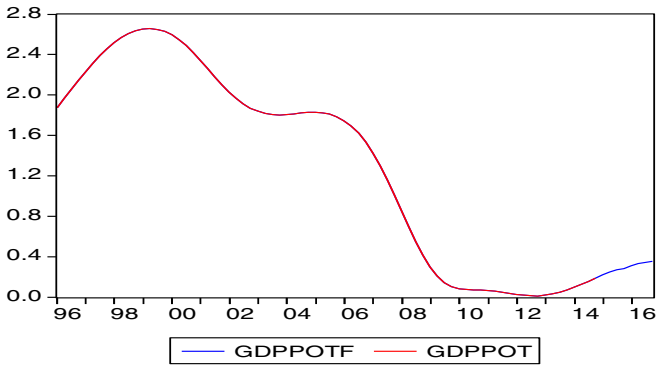

Fig. 6. The evolution of the government consumption in the Euro Area (%, yoy)

4. Conclusions

There can be drawn several interesting conclusions from our analysis. On the one hand, the GDP pace was on a downward trend before the crisis, as the positive shock of the Euro adoption was not accompanied by the structural reforms (especially in terms of labour markets). On the other hand, the waves of the Great Recession intensified this trend, as the sudden stop of capital flows had a negative impact, especially for the countries with huge macroeconomic deficits (the Southern Europe). Consequently, the Euro Area has passed through a severe and prolonged macroeconomic adjustment process. According to our analyses there are gradual re-launch perspectives for the Euro Area in the medium-run. The recovery would be based on capital investments, both private and public. At the same time, the gap between the net foreign demand and the domestic demand would narrow in our core macroeconomic scenario. However, we point out to the risks factor and challenges for this scenario: the banking sector problems; the level of the public debt; the normalization of the ECB policy; the re-launch of the economic convergence in the region.

Acknowledgements

This work was supported by the project "Post-Doctoral Studies in Economics: training program for elite researchers - SPODE" co-funded from the European Social Fund through the Development of Human Resources Operational Programme 2007-2013, contract no. POSDRU/89/1.5/S/61755.

References

Brockwell, P.J. and Davis, R.A. 1996. Introduction to Time Series and Forecasting, Springer-Verlag, New York

D'Auria, F., et al. 2010. The production function methodology for calculating potential growth rates and output gaps. European Commission Economic Papers, 420.
http://ec.europa.eu/economy_finance/publications/economic_paper/2010/ecp420_en.htm (access august 2013).

Dobrescu, E., 2006. Macromodels of the Romanian Market Economy. Bucharest: Economica.

Dobrescu, E., 2009. Estimating the Total Factor Productivity in Romanian Economy. Amfiteatru Economic, 26, pp. 512-521.

Hodrick, R. and Prescott, E. C., 1997. Postwar U.S. Business Cycles: An Empirical Investigation. Journal of Money, Credit and Banking, 29 (1), pp. 1-16.

Rădulescu, A., 2012.Convergente si divergente in procesul de integrare economica si monetara europeana", Academia Romana, proiect POSDRU/89/1.5/S/61755.